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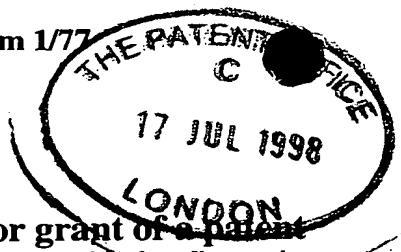

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1. [redacted] reference — **A25481**

2. Patent application number *(The Patent Office will fill in this part)* — **9815692.0**

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

BRITISH TELECOMMUNICATIONS public limited company
81 NEWGATE STREET
LONDON, EC1A 7AJ, England
Registered in England: 1800000

Patents ADP number *(if you know it)* — **1867002**

If the applicant is a corporate body, give the country/state of its incorporation — **UNITED KINGDOM**

4. Title of the invention — **TELECOMMUNICATONS MESSAGING SYSTMES**

5. Name of your agent *(if you have one)* — **TIMOTHY GUY EDWIN, LIDBETTER**

"Address for Service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

BT GROUP LEGAL SERVICES
INTELLECTUAL PROPERTY DEPARTMENT
HOLBORN CENTRE
120 HOLBORN
LONDON, EC1N 2TE

Patents ADP number *(if you know it)* — **1867001** 07107774001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day/month/year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
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YES

Patents Form 1/77

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Continuation sheets of this form	
Description	9
Claim(s)	2
Abstract	1
Drawing(s)	7 +7

10. If you are also filing any of the following, state how may against each item

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Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.
Signature(s) Date:
17 JULY 1998
Timothy Guy Edwin, LIDBETTER, Authorised Signatory

12. Name and daytime telephone number of person to contact in the United Kingdom
Rohini R Ranjitkumar 0171 492 8456

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Telecommunications Messaging Systems

The invention relates to voicebank and other messaging applications in telecommunications systems. Such applications are now becoming commonplace, allowing communication to be made between a calling party and a called party without the need for both to be available simultaneously. A called party may be unable or unwilling to answer the telephone when a call is made, for example because he does not wish to be disturbed, or he is not present, or engaged on another call. In the case of a mobile telephone, the telephone may be out of range of the radio base station network, or it may be switched off. In such circumstances a voicebank system can be used to divert incoming calls to a messaging service, which comprises a data store in which a message can be left for subsequent retrieval by the party for whom the call was intended.

Some voicebank systems are provided as part of the telephone terminal equipment, (so-called "telephone answering machines") but, increasingly, network operators are providing the facility as part of the network itself. This reduces terminal complexity, and allows messages to be left even when the destination terminal is not operational

Systems operating on the same basic principles are also known for storing data messages (for example facsimile transmissions) when the destination terminal is unavailable, for subsequent retrieval by the called party. In the following specification, the term "message bank" will be used to cover any such service, including voicebank services. It is envisaged that any type of message, for example video, may be sent according to the system of the invention, according to the capabilities of the terminal equipment used.

In a typical system of this kind, a calling party, on being connected to the message bank system, receives a prompt inviting the caller to leave a message. In a voicebank system, the prompt is generally a spoken message, which may be recorded, or may have been generated synthetically. For a facsimile the prompt is the "handshake" codes necessary to prompt the calling facsimile machine to transmit. Any message then transmitted by the calling party is stored in the message bank. The message may be stored in any suitable form. This is generally in digital form, but many terminal-based voicebank systems use magnetic tape to record an analogue signal.

When the called party wishes to access his message bank, he transmits a command to the message bank system. For a terminal-based system, this merely requires appropriate keypad commands on the terminal equipment. If the system is network-based, the command must include information to identify which user is calling. For many applications this information is generated automatically, using calling line identity (CLI), or identification codes such as the user identity code (IMSI) which identifies the SIM (subscriber identity module) of a terminal operating according to the GSM (Global System for Mobile communications) standard. However, control of the system requires specific commands, such as "play next message", "repeat this message", "delete message" to be transmitted. These are generally transmitted to the network functionality using key-entry commands, which are transmitted using DTMF (dual tone multiple frequency) codes or the like.

Network capacity is a scarce resource, particularly with the increasing demand for high-bandwidth services such as high-speed data and real-time video services. Analogue speech channels also require a wide bandwidth. It is therefore desirable to avoid the unnecessary allocation of bandwidth which is not required for the service requested.

According to the invention, there is provided a message bank system comprising message storage means, means for transmitting a message from a remote terminal to the message storage means, and/or retrieving a message from the message storage means, over relatively broad bandwidth communications links, and means for transmitting control signals over relatively narrow bandwidth communications links for controlling the operation of the message bank system.

In a preferred arrangement the relatively broad bandwidth communications link is a traffic channel, suited to the nature of the message to be stored (voice, data etc) whilst the relatively narrow bandwidth communications links are out-of-band signalling channels. This arrangement reduces the network resources required to operate the system. In particular, separation of control signals from the channel carrying the message itself allows the use of a simplex (one-way) channel for the relatively broad bandwidth message-carrying channel. By eliminating the need for the return channel, network capacity can be improved. This channel may also carry any control signals to be transmitted in the same direction, which in turn allows the use of a simplex narrow-bandwidth channel to be used for control signals in the reverse direction.

The message bank system may comprise means for identifying whether the remote terminal requires transmission and/or receipt of control signals over a relatively broad bandwidth communications link in the direction contrary to that in which the message is to be transmitted: being arranged to establish said one-way broad bandwidth link if the said terminal does not require such a broad bandwidth link, and to establish a two-way broad bandwidth link if the said terminal requires such a broad bandwidth link. The message bank system may further comprise means to convert the said two-way broad bandwidth link to a one-way broad bandwidth link during the course of a call should the requirement for a broad bandwidth link in the reverse direction cease. The message bank system may alternatively comprise means to reverse the sense of the one-way broad bandwidth communications link during the progress of a call.

The invention also extends to telecommunications equipment for use with the system defined above, comprising means for receiving said control signals over a relatively narrow band channel, and converting said control signals into visible or audible prompt signals readable by the human or machine transmitting or retrieving the message.

According to a further aspect, the invention comprises a method of transmitting a message from a remote terminal to a message storage means, or retrieving a message from a message storage means, over relatively broad bandwidth communications links, wherein signals for controlling the operation of the message bank system are transmitted over relatively narrow bandwidth communications links

The invention is suitable for message deposit and for message retrieval, provided in each case that the terminal used allows the processing of out-of-band signalling. For message retrieval the relatively broad bandwidth link used for transmitting the requested messages can also be used for transmitting voice prompts and the like. However, for message deposit to be carried out in this way, the originating terminal requires a facility for processing and displaying prompts and other signals received from the network in the out-of-band format. As the system is preferably compatible with existing terminals and networks (including the traditional Public Switched Telephone Network (PSTN)) it will not always be possible to operate message deposit in this way. In appropriate circumstances the invention may be used to support only one of these two functions. It may also be

used selectively, operating in a mode according to the invention only in respect of suitable terminals, and/or only in respect of message retrieval, being used in a second, conventional, mode otherwise.

Embodiments of the invention will now be described, by way of example only, with reference to the drawings, in which:

Figure 1 is a schematic diagram showing the general arrangement of a message-bank system in which messages are stored in a conventional manner;

Figure 2 is a schematic diagram showing the general arrangement of a message-bank system in which messages are stored in a manner operating according to the invention

Figure 3 is a diagram illustrating the operation of the system of Figure 2.

Figure 4 is a diagram illustrating an alternative method of operation of the system of Figure 2.

Figure 5 is a schematic diagram showing the general arrangement of a message-bank system in which messages are retrieved in a conventional manner;

Figure 6 is a schematic diagram showing the general arrangement of a message-bank system in which messages are retrieved in a manner operating according to the invention.

Figure 7 is a diagram illustrating the operation of the system of Figure 6.

In Figures 1, 2, 5 and 6 there is shown a message bank 1. In the preferred embodiment this is a network-based message bank, but in Figures 1 and 2 it may instead be a terminal-based system, more commonly known as an "answering machine". In such systems, of course, retrieval takes place at the user's terminal, without the use of the network. The messaging system is connected through a telecommunications network 2 to a terminal 3. In Figures 1 and 2 this is the terminal used by the calling party to leave a message, whereas in Figures 5 and 6 it is the terminal used by the called party to retrieve the message. The connection 4, 5 is capable of supporting the message in the format in which it is transmitted (speech, broadband data, etc) and is a conventional duplex link 4 in Figures 1 and 5. In Figure 2 it is a simplex (one-way) link 5 from the terminal 3 to the message bank 1, whilst in Figure 6 it is a simplex (one-way) link 6 in the converse direction. An "out-of-band" signalling channel 7 is also shown in the Figures. This signalling channel 7 may in practice be the signalling channel used in initially setting up the call; however in Figures 2 and 6 separate simplex signalling channels (operating in

the sense indicated) may be employed for the additional signalling to be discussed with reference to those figures.

In the prior art arrangement shown in Figure 1, the voice messaging system operates as follows. When a call is set up over a telecommunications system, a signalling connection 7 is first set up, which provides the various call set-up functions including the provision of ringing tone, etc. When the called party answers, a full telephone connection 2 is set up. In the arrangement of Figure 1, when a caller 3 attempts to make a telephone call, the network 2 diverts the call to the message bank 1. This may occur because the called party has set up the diversion manually. Alternatively, the diversion may be set up automatically if the called party's telephone does not respond, is busy on another call, is switched off or (for a mobile telephone) is out of range of the base station network. The message bank 1 has separate addresses for each telephone served by the network, and calls to the message bank 1 are routed to the address corresponding to the called number.

The network, on connection of a telephone 3 to an address in the message bank 1, first establishes a signalling link 7. If the call is connected, a conventional telephone connection 2 is set up over the network, over which prompts are sent to the caller 3 from the message bank 1, inviting the caller 3 to leave a message. These prompts are conventionally in the form of synthesised or recorded speech, suitable for the telephone connection. The calling party 3 can then transmit a spoken message over the connection 2 for storage in the appropriate address of the message bank 1, for subsequent retrieval.

If the calling party 3 is a facsimile or computer modem, the nature of the signals to be stored in the message bank 1 will be different, and in order to correctly co-operate with the calling party 3, the prompts transmitted from the message bank have to be appropriate. For example, a human listener cannot interpret or generate the speech-band signals used to control facsimile machines. Similarly, facsimile machines and modems will not respond to voice prompts. The selection of the appropriate prompt can be achieved by having separate message bank facilities for speech and data, requiring diversion to different numbers. Alternatively, a single message bank 1 may be made capable of identifying the various "handshake" signals generated by different types of calling device, and

transmitted over the telephone connection 2 when first set up. In response, the message bank 1 transmits a prompt of the type appropriate to the type of caller.

Figure 5 shows the message retrieval process for a conventional messa bank system. When a user 3 wishes to access the message bank, he dials a number to establish a conventional telephone connection 2 to the message accessing function of the message bank 1. The message bank may identify the user's individual address within the message bank 1 by using calling line identity (CLI) signals transmitted over the signalling connection 7 during call set-up. The message bank 1 next transmits a prompt to the user over the newly-established telephone connection 2. The format of this prompt may be a voice message, or a facsimile or modem "handshake", depending on the nature of the messages stored in the message bank, and/or the nature of the terminal 3 making the call. If the desired message bank address has not already been identified by CLI, as described above, this prompt may request the user 3 to identify the address required. This allows a user to access his message bank. Password protection may be used to avoid unauthorised access.

The user may control the playback of messages stored in the message bank 1 using commands transmitted from his terminal 3 over the telephone connection 2. For example a user may wish to list the messages (by time, calling number, or other characteristics), play a message from the list (next, previous etc), or delete a message. The control commands are typically transmitted as DTMF (dual tone multiple frequency) signals over the telephone connection 2.

The system according to the invention will now be described with reference to Figures 2, 3, 4, 6 and 7. As has been described above, the invention is primarily concerned with message retrieval, but it may also be used for message deposit and this will be described first, with reference to Figures 2 and 3.

When an incoming call is routed to the message deposit function of the message bank 1, (step 31, Figure 3) the telecommunications system (exchange 2) identifies that the called party is a message bank (step 32) and establishes a one-way (simplex) telephone connection 5 to the message bank (step 33). No channel is established in the reverse direction, apart from the signalling connection 7 established during the initial call set-up process 31/32. Since channels are generally allocated in pairs (e.g. frequency pairs in radio communications, wir pairs in fixed networks), simplex operation releases the partner channel for other

purposes. If the calling party 3 is a mobile telephone, it may be connected to the radio base station using an uplink radio channel which would otherwise be unusable, for example because the signal quality on the corresponding downlink channel is below acceptable limits. In the more general case, where both paths are usable, they may be used to provide two independent simplex links. In particular, there are network paths which, if used as conventional duplex paths, would suffer from echo (the return on one path of a signal transmitted on the other, resulting from acoustic or electrical feedback between the two channels). Parts of these paths may nevertheless be usable as independent simplex links, as the connection from which the feedback would have originated would not form part of both links.

Unlike the prior art arrangement of Figure 1, the prompts that are sent from the message bank 1 to the user 3 (step 34) are carried in out-of-band signalling using the signalling channel 7. This requires that the calling party 3 is able to read and process such signals (step 35). This may be achieved by using specialised terminal equipment 3 capable of operating with such signalling. Alternatively, the out-of-band signals may be converted to conventional in-band prompts at some intermediate point in the network. This intermediate point may be the local exchange (or mobile switching centre for a mobile telephone) to which the user terminal 3 is connected - in this case the connection between that intermediate point and the user 3 would then be by conventional duplex link.

The network may recognise whether the terminal 3 is of a type suitable for handling such out-of-band prompts, and establish a link 2 of appropriate type (simplex or duplex) accordingly, either between the user terminal 3 and the intermediate point (the rest of the link to the message bank being simplex), or throughout between the user terminal 3 and the message bank 1.

The prompts may control a display to give instructions to the user of the terminal 3. The terminal 3 may convert the prompts into instructions (voice or visual display), for example telling the user when to speak. In the case of a facsimile or computer modem connection, the prompt may control the machine at the terminal 3 to cause it to transmit its data, for example using "Internet Protocol" (IP). The message to be stored can then be transmitted (step 38) over the simplex link 5 to be stored (step 39) in the message bank 1.

The message bank 1 may be customer-provided terminal equipment, or it may be associated with the network equipment, for example at a switching point 2.

In an alternative arrangement, illustrated in Figure 4, the network 2 initially sets up a conventional duplex broad bandwidth link 4 (step 42) in response to the call set-up request (41). The message bank 1 sends the "prompt" message (step 44) over the "down" (message bank to caller) leg of this duplex link 4. The message bank then sends a command 46 to the network 2 to drop the "down" leg, (step 47) to leave only the "up" leg, thereby forming a simplex link in the "up" direction. The caller, on receiving the prompt (step 45), responds to it by sending his message (step 48) over the simplex link 5 to be received by the message bank 1 (step 49).

Instead of establishing a full duplex link 4 and then dropping one leg of it, a time division duplex arrangement may be employed, as also illustrated in Figure 4. In this process the network 2 initially sets up (step 42) a simplex link 6 from the message bank 1 to the user terminal 3. This is used to send the prompt (step 44), and then the direction of the simplex link is reversed (step 47) to create a simplex link 5 over which the message can be transmitted.

Message retrieval operates in the manner illustrated in Figures 6 and 7. When a user 3 accesses the message facility 1 (step 71), a signalling connection 7 is first set up. The message facility 1 may use calling line identity to identify which messaging address is required, and whether the calling terminal has the out-of-band signalling capacity (step 72). A simplex voiceband connection 6 is then set up from the message bank 1 to the terminal 3 (step 73), and prompts are transmitted over this connection to the user (step 74). The user, on receiving such prompts (step 75) responds with signals entered on the keypad or other data entry device of his terminal 3 (step 76), and these are transmitted over the signalling connection 7 to control the further operation of the message bank (step 77), and in particular to cause it to transmit selected messages (step 78) over the wide bandwidth link 6 to be received by the user 3 (step 79).

Although messages may be sent from any terminal for deposit in the message bank, the terminal 3 used to retrieve messages is generally the user's own terminal, which can be designed to be compatible with the network with which it operates. In particular, it can be provided with the means to generate out-

of-band signals. However, as already mentioned, a user may use other terminals 3 to access his message facility 1 (subject to password control, etc), and such other terminals may not all have the out-of-band signalling facility. In such cases conventional duplex provision may need to be provided for all or part of the connection 2. This may take the form of conversion at some point in the connection 2 between DTMF tones and out-of-band signals. The selection of simplex or duplex operation may be made during the call set-up process, according to the signals sent to the network over the signalling channel 7 by the terminal 3 (step 7). This may be done either by identifying the terminal as simplex-compatible from its calling line identity, or by assessing whether it responds to the first prompt sent to it by transmitting an in-band signal (thereby signifying a duplex connection is required) or an out-of-band signal (signifying it is suitable for operation in simplex mode)

As discussed above, the message bank 1 may be customer-provided terminal equipment, or it may be associated with the network equipment, for example at a switch. In the former case, of course, network facilities are only required for retrieval if the messages are being accessed remotely, from another terminal 3.

The out-of-band signals used may be according to any suitable protocol, such as "CLASS" or "Internet Protocol" (IP). The invention is particularly suited for use in multi-media networks, which have advanced add/drop bearer capabilities to allow asymmetric data transfer.

CLAIMS

1. A message bank system comprising message storage means, means for transmitting a message from a remote terminal to the message storage means, and/or retrieving a message from the message storage means, over relatively broad bandwidth communications links, and means for transmitting control signals over relatively narrow bandwidth communications links for controlling the operation of the message bank system.

2. A message bank system according to claim 1, comprising means for establishing a one-way broad bandwidth communications link in the direction in which the message is to be transmitted.

3. A message bank system according to claim 2, comprising means for identifying whether the remote terminal requires transmission and/or receipt of control signals over a relatively broad bandwidth communications link in the direction contrary to that in which the message is to be transmitted: being arranged to establish said one-way broad bandwidth link if the said terminal does not require such a broad bandwidth link, and to establish a two-way broad bandwidth link if the said terminal requires such a broad bandwidth link.

4. A message bank system according to claim 3, further comprising means to convert the said two-way broad bandwidth link to a one-way broad bandwidth link during the course of a call when the requirement for a broad bandwidth link in the reverse direction ceases.

5. A message bank system according to claim 2, comprising means to reverse the sense of the one-way broad bandwidth communications link during the progress of a call.

6. Telecommunications equipment for use with the system of claims 1 to 5, comprising means for receiving said control signals over a relatively narrow band channel, and converting said control signals into visible or audible prompt signals readable by the human or machine transmitting or retrieving the message.

7. A method of transmitting a message from a remote terminal to a message storage means, or retrieving a message from a message storage means, over relatively broad bandwidth communications links, wherein signals for controlling the operation of the message bank system are transmitted over relatively narrow bandwidth communications links

8. A method according to claim 7, wherein a one-way broad bandwidth communications link is established in the direction in which the message is to be transmitted.

9. A method according to claim 8, wherein it is determined whether the remote terminal requires transmission and/or receipt of control signals over a relatively broad bandwidth communications link in the direction contrary to that in which the message is to be transmitted; and said one-way broad bandwidth link is established if the said terminal does not require such a broad bandwidth link, and a two-way broad bandwidth link is established if the said terminal requires such a broad bandwidth link.

10. A method according to claim 9, wherein said two-way broad bandwidth link is converted to a one-way broad bandwidth link during the course of a call when the requirement for a broad bandwidth link in the reverse direction ceases.

11. A method according to claim 8, wherein the sense of the one-way broad bandwidth communications link is reversed during the progress of a call.

12. A method according to any of claims 7 to 11, wherein said control signals received over a relatively narrow band channel are converted into visible or audible prompt signals readable by the human or machine transmitting or retrieving the message.

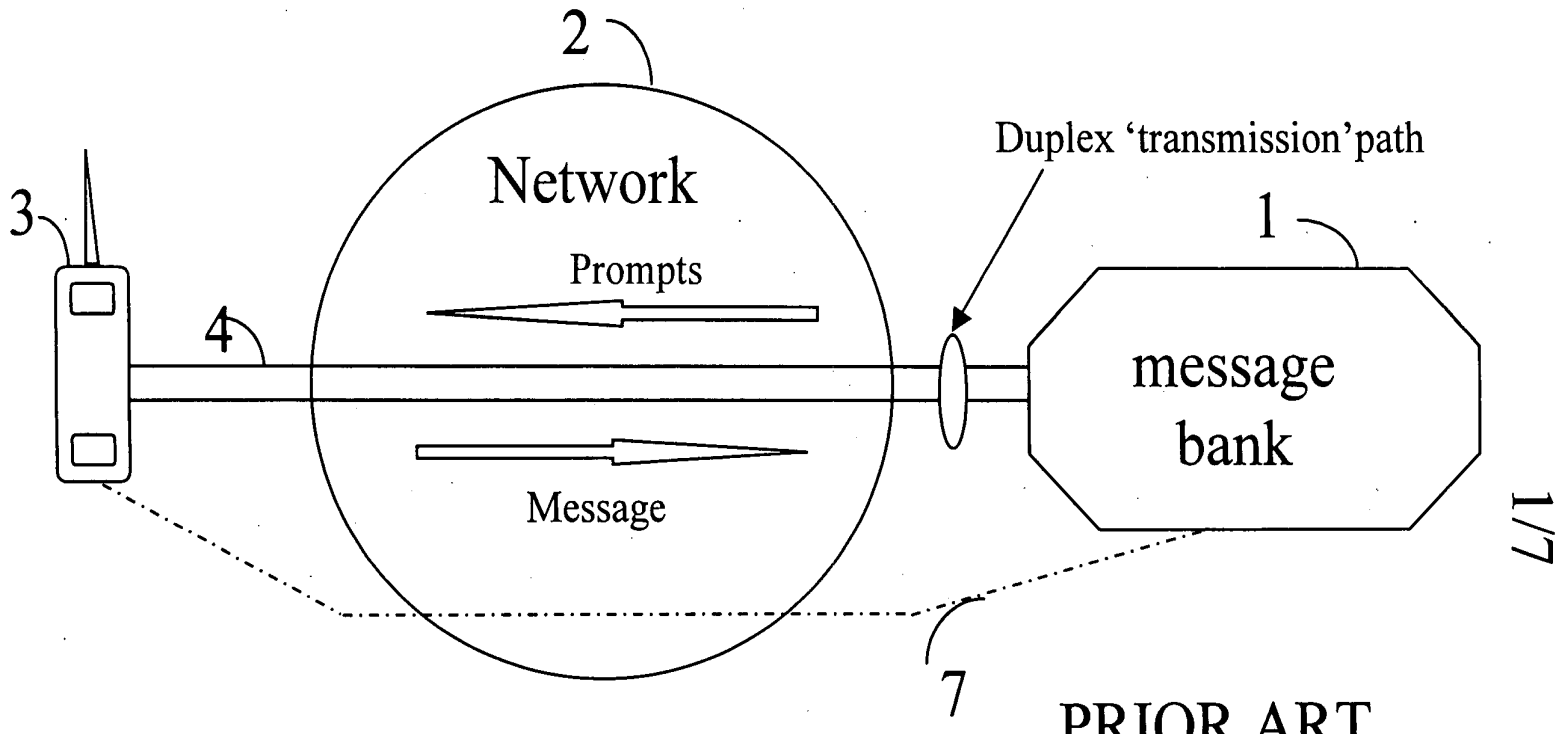
ABSTRACT

Telecommunications Messaging Systems

A Message retrieval system is arranged to allow control functions to be carried in out-of-band signalling channels, thereby allowing a reduced bandwidth to be required for message storage and retrieval. In particular, storage or retrieval can be carried over a simplex broad bandwidth link, as no broad bandwidth signal is transmitted in the reverse direction.

When a user 3 accesses the message facility 1, a signalling connection 7 is first set up. The message facility 1 may use calling line identity to identify which messaging address is required, and whether the calling terminal has the out-of-band signalling capacity. A simplex voiceband connection 6 is then set up from the message bank 1 to the terminal 3, and prompts are transmitted over this connection to the user. The user, on receiving such prompts responds with signals entered on the keypad or other data entry device of his terminal 3, and these are transmitted over the signalling connection 7 to control the further operation of the message bank, and in particular to cause it to transmit selected messages (step 78) over the wide bandwidth link 6 to be received by the user 3.

Figure (6)



PRIOR ART

Figure 1

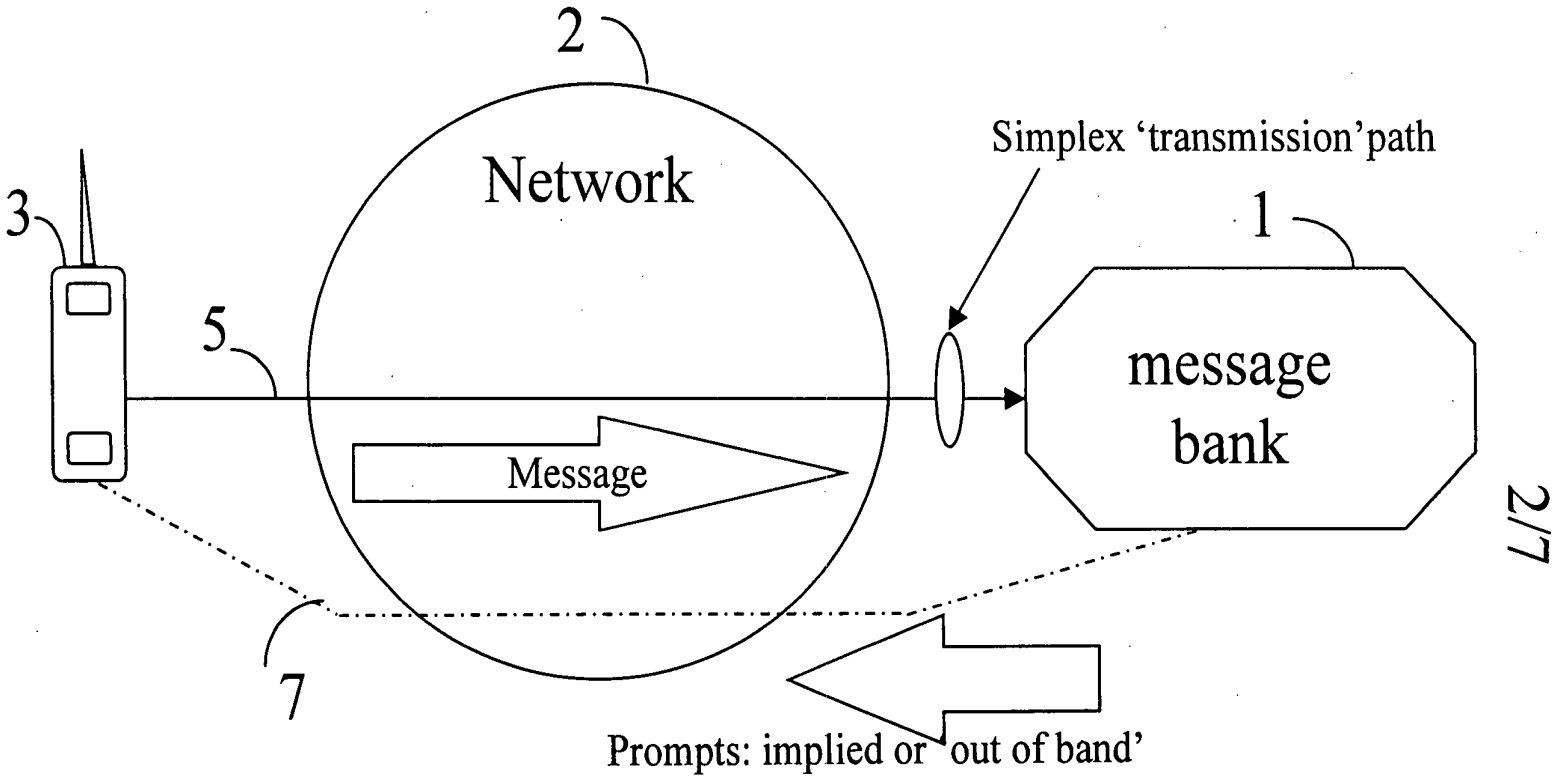

2
Network
Simplex 'transmission' path
1
3
5
message
bank
Message
2/7
7
Prompts: implied or 'out of band'

Figure 2

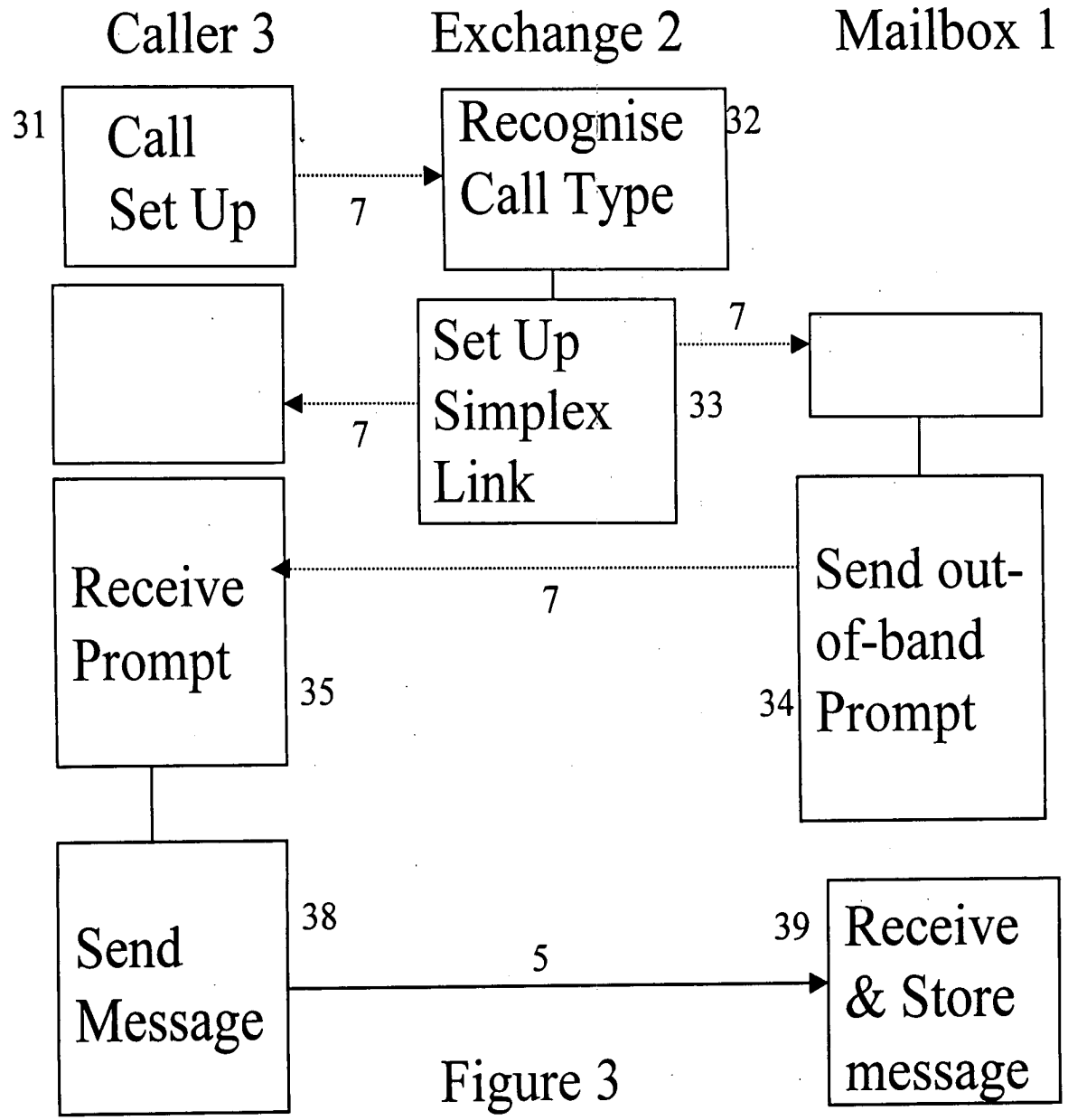
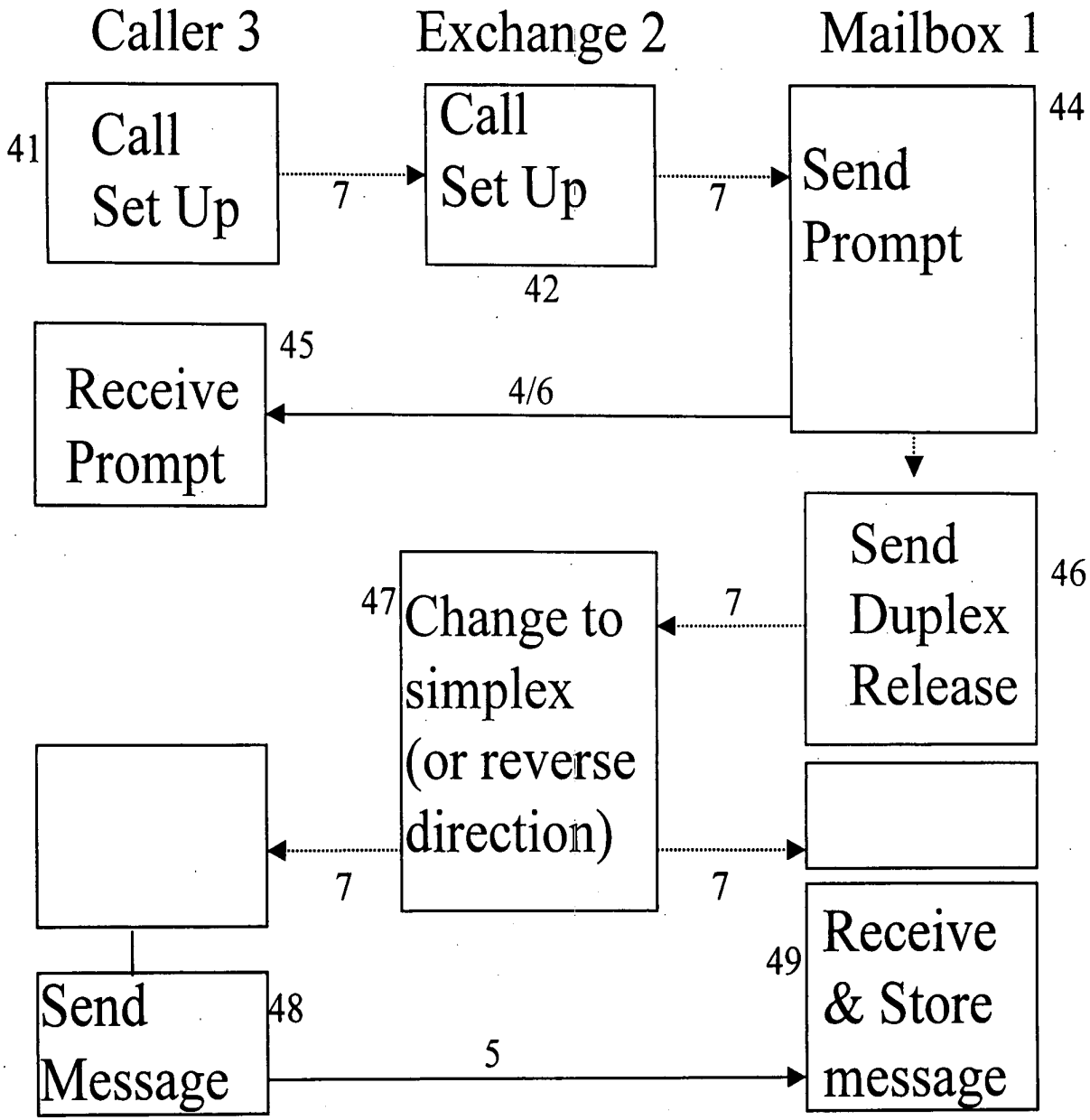

Caller 3
Exchange 2
Mailbox 1
31
Call Set Up
7
Recognise Call Type
32
Set Up Simplex Link
33
7
7
Receive Prompt
35
7
Send out-of-band Prompt
34
Send Message
38
5
39
Receive & Store message

Figure 3


Caller 3
Exchange 2
Mailbox 1
41
Call Set Up
7
Call Set Up
42
7
Send Prompt
44
Receive Prompt
45
4/6
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47
Change to simplex (or reverse direction)
7
7
7
Send Message
48
5
Receive & Store message
49

Figure 4

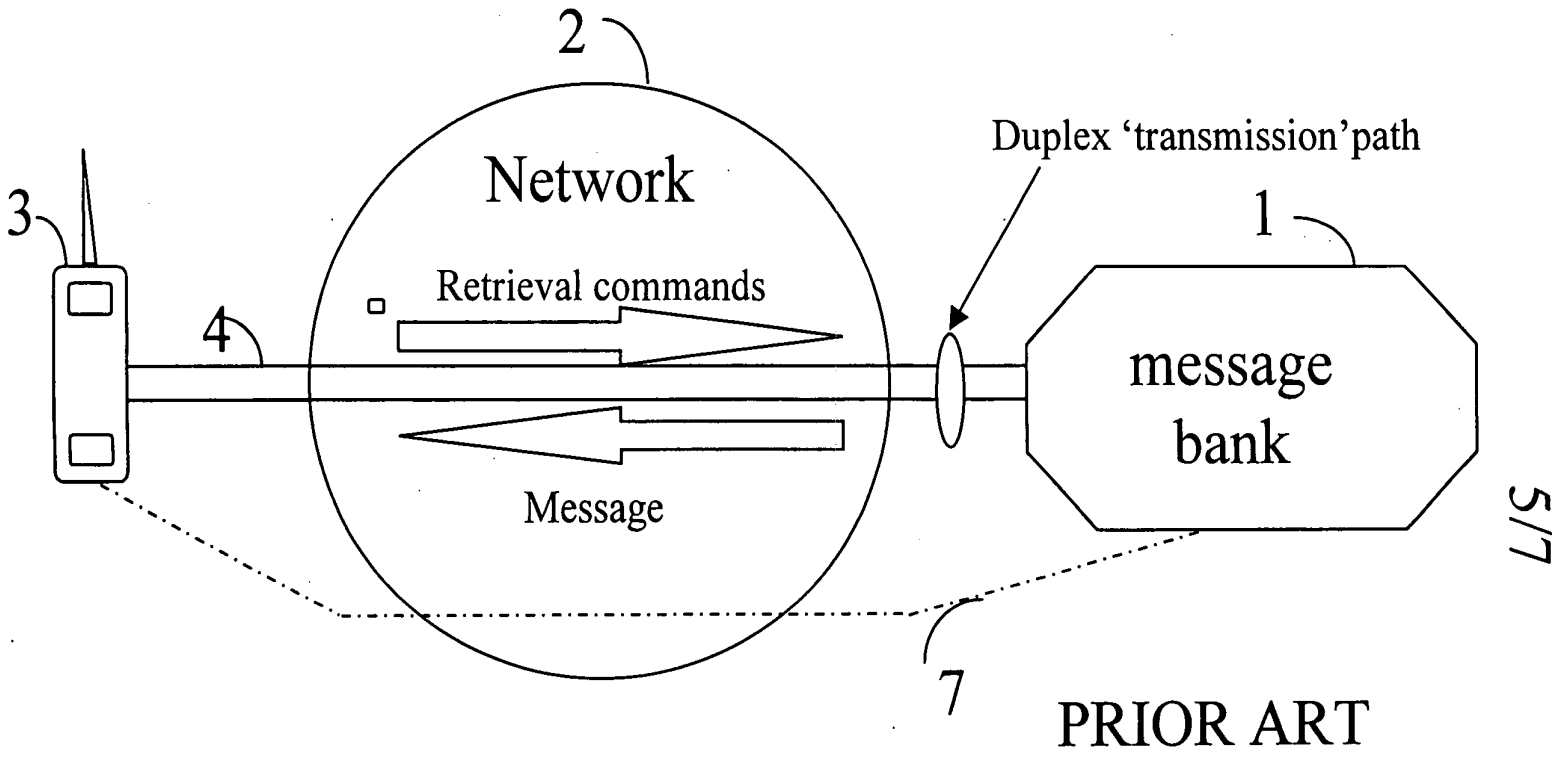
2
Network
Duplex 'transmission' path
3
1
Retrieval commands
4
message
bank
Message
7
PRIOR ART

Figure 5

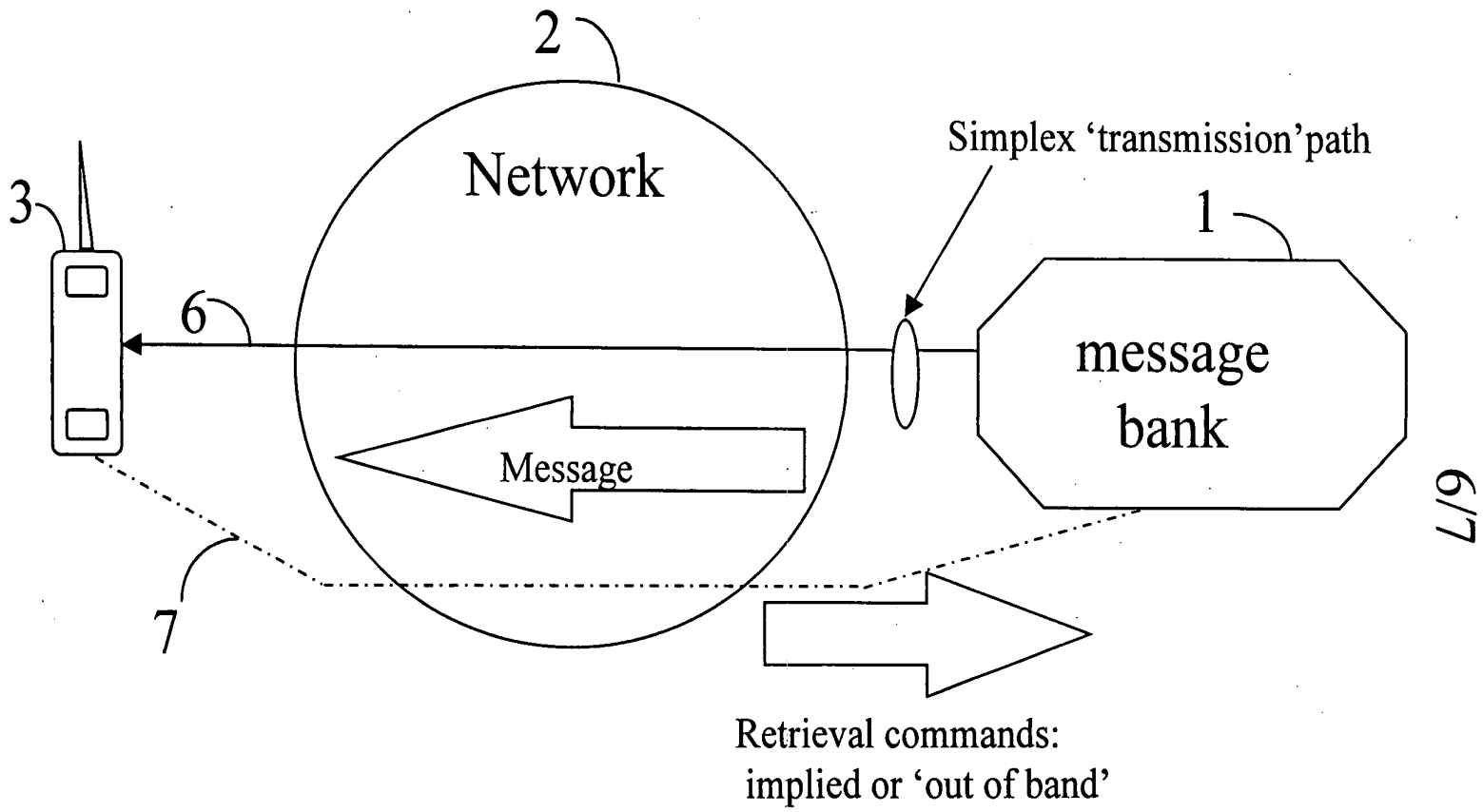
2
Network
Simplex 'transmission' path
1
3
6
message
bank
Message
7
Retrieval commands:
implied or 'out of band'

Figure 6

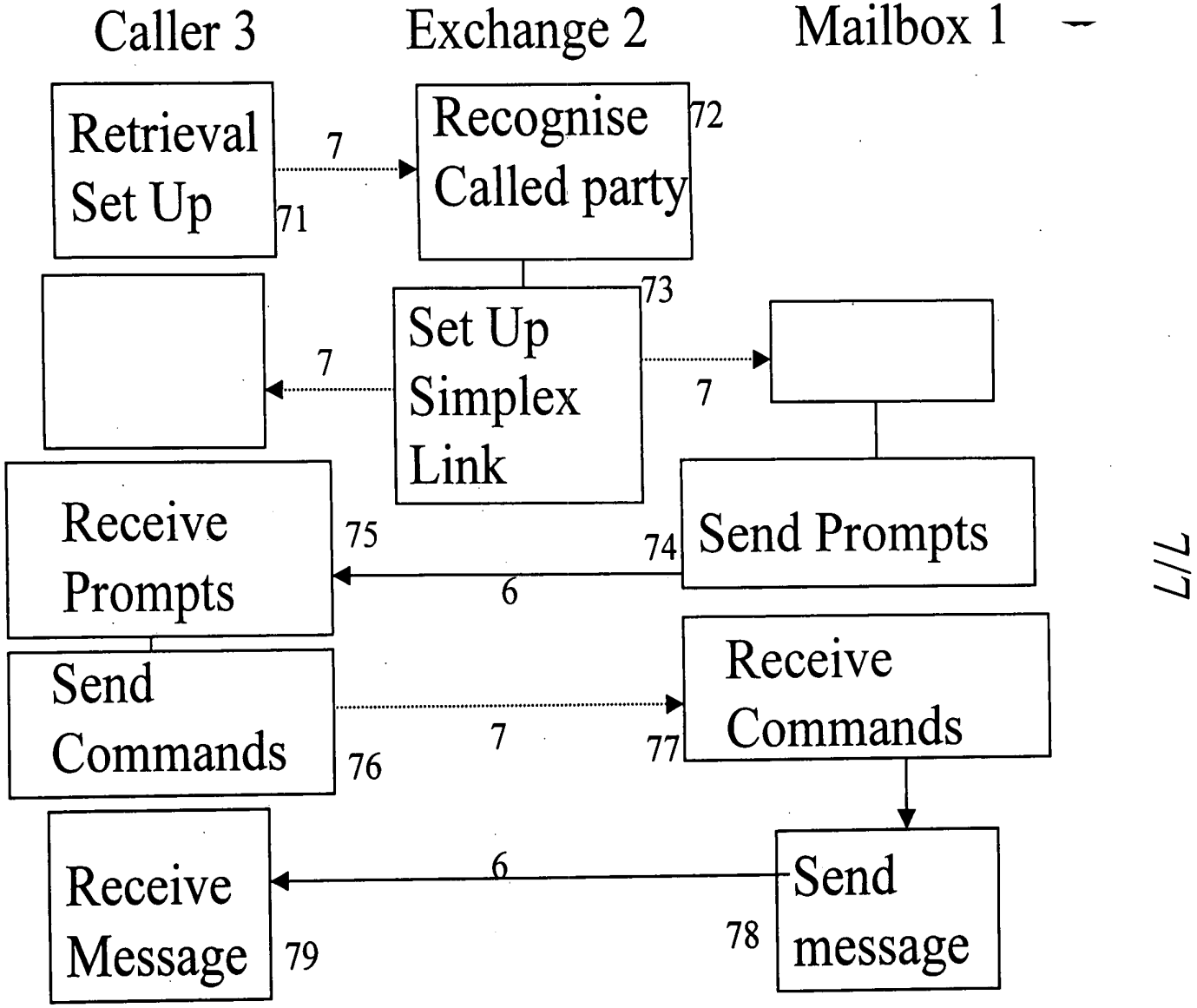
Caller 3
Exchange 2
Mailbox 1
Retrieval Set Up
71
7
Recognise Called party
72
Set Up Simplex Link
73
7
7
Receive Prompts
75
Send Prompts
74
6
Send Commands
76
7
Receive Commands
77
Receive Message
79
6
Send message
78

Figure 7

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BT GROUP LEGAL SERVICES

14.7.99.